Remarks: Examination Report

Claims 1-34 are pending in the application. Claims 1-33 were rejected. Claim 34 was allowed.

1. Claims 1-24 and Claims 31-33 were rejected under 35 U.S.C. 101 because the claimed invention was directed to non-statutory subject matter. Independent claims 1,15,19 and 31 have been modified in this amendment to correct this deficiency.

2. Claim 14 was rejected under 35 U.S.C 101 because the claimed invention was not supported by a specific and substantial asserted utility. Applicant believes that the examiner was referring to Claim 13 since it is Claim 13 that refers to 'a computer readable storage medium' and not Claim 14. Under that assumption, Applicant has modified Claim 13. Page 20 of the Specification supports this utility.

3. Claim 14 was rejected under 35 U.S.C. 112, first paragraph. Again, assuming this is referring to Claim 13, Applicant believes that the modification to Claim 13 should correct this deficiency.

4. Claim 24 was rejected under 35 U.S.C. 112 as being indefinite. Claim 24 has been modified to correct this deficiency.

5. Claims 6, 19-24, 26 and 31-33 were objected to because of certain informalities. The informalities have been corrected. Claims 6, 19, 26 and 31 have been amended.

6. Claims 1-12 and 14-30 were rejected under 35 U.S.C. 102(b) as being anticipated by Madhow et al. (US 6,175,587 (referred to herewith as Madhow).

Central to the examiner's rejection of Applicant's claims appears to be the argument that Madhow teaches the handling of interference contributed by symbols of different lengths. Applicant contends that the reference to a length 64 symbol and the illustration of a 8

length symbol in Madhow are independent examples, with no suggestion that the two lengths co-exist in a transmission or reception. Applicant's invention specifically addresses this issue. Applicant's Specification itself makes a reference to the prior art and its limitations. On Page 3-4 of the Specification as filed, "According to one such system, multiple access interferences are ranked, an interference matrix is formed using only left and right overlapping interference reference vectors related to a symbol of a channel of interest and a projection operator constructed with the interference matrix is applied directly to the reference vector, such that interference is suppressed. The projection operator, which projects the reference signal onto a subspace orthogonal to the interference, involves a matrix inverse. A full or pseudo matrix inverse computation is typically required. However, such prior art systems have been incapable of handling communication systems supporting symbols of different lengths. For example, such interference cancellation systems are unable to cancel interference from signal paths in which the interference consists of symbols having lengths that are less than half the length of symbols contained in a desired signal path, because the interference matrix formed using left and right overlapping interference reference vectors cannot span the longer symbol of interest. Accordingly, such systems cannot be applied to recent spread spectrum communication systems, such as CDMA 2000 that support supplemental (short) Walsh covering codes."

Regarding the rejection of Claim 1, Madhow discloses an example system processing both first and second signal at length 64 in figure 2. Madhow also discloses an example system processing both the first and the second signal at length 8 in figure 3. Applicant contends that Figure 3 uses length 8 only to simplify the illustration of the invention by showing length 8 vectors rather than length 64 vectors. Nowhere in their disclosure does Madhow address the issue of constructing an interference matrix for a case when the first and second signals have different symbol lengths. It is not obvious from combining Figures 2 and 3 in Madhow how it can be applied in a scenario with various length symbols. As noted, the matrix U_i uses components of codes of signals of length 8 in the interfering signal path which is the same length 8 as codes in the desired signal path. It does not however disclose

using length 8 codes from interfering signal paths while attempting to remove interference from the desired signal path at length 64. As Madhow (Col 5, line 67 and Col. 6, line 1) describes it, "The example in figure 3 is for a system using Walsh codes of length 8". The desired signal in this case is also clearly of length 8 as disclosed, "The equivalent synchronous model for the rake finger aligned with the first multipath element provides a set of basis vectors for the interference observed by this finger".
The interference referred to in Madhow comes from other codes (U0,1) from the same finger and codes U0,2 and U1,2 from the interfering signal which is the second ray. Applicant also notes that U0,1 does not belong to the same said interference path as $U^R0,2$ and $U^L0,2$. Clearly, the at least 3 component vectors of the interference matrix do not come from the same said interference signal. This is a consequence of the fact that Madhow does not disclose interference matrix construction for the case when the interference and the signal of interest are at different lengths.
To summarize, Figure 2 in Madhow discloses reception at length 64. Figure 3 discloses computational components for processing at length 8 alone. The combination of these two (or processing signals with mixed symbol lengths) is not disclosed nor would it have been obvious to one skilled in the art.

Applicant believes that the rejections to the other dependent Claims 2-14 are also traversed by this argument, since Madhow does not teach the features in Claim 1.

Regarding the rejection of Claim 3, while Madhow teaches a symbol of first length 64 and a symbol of second length 8 as separate examples, they do not teach the simultaneous transmission (or reception) of two lengths of symbols. Applicant contends that Claim 3 is novel and inventive over Madhow.

Regarding Claim 4, Madhow does not disclose intermediate interference vectors, since they do not apply to multiple length systems. Madhow discloses use of either partial interferences (U^L and U^R) or full symbol interferences (U0,1) but never intermediate interferences as in codes corresponding to symbols of interfering signal path that are completely encompassed by the duration of the symbol of the desired signal path. For

example, in a length 64 case, chips 9 to 16 of a code in the interfering signal path for a system with variable length codes is considered an intermediate vector. Applicant contends that claim 4 is non-obvious and novel over Madhow.

Regarding claim 5, again it is non-obvious how the interference vectors will be of length 64 when the component codes are of length 8. Madhow only claims the case when the interference and the said signal of interference are of the same length. In this special case, it is obvious that though the interference and the signal of interest may be misaligned in time, the interference vectors need to be of length 8. The invention in the instant application addresses the case when the symbol lengths may be varied across the system.

Regarding claim 15, $U^R0,2$ in Madhow does not contain a non-zero value in its first element. Thus, there is no support in Madhow for "each of said at least three interference vectors includes zero values for a plurality of said elements and a non-zero value for at least a first element.", which is the limitation in Claim 15.

Claims 16-18 are dependent on Claim 15, and should hence be novel and non-obvious over Madhow.

Regarding Claim 19, Madhow does not teach the reception of signals with multiple symbol lengths. The vectors, $U^L0,2$, $U^R0,2$ and U0,1 do not represent the "three symbols of ~~a~~ the first channel of said interfering signal at least partially overlap said signal of interest", but instead are symbols of three different channels present in the signal. Applicant again notes (as in Claim 1) that U0,1 does not belong to the same said interference path as $U^R0,2$ and $U^L0,2$. Clearly, the at least 3 component vectors of the interference matrix do not come from the same said interference signal. This is a consequence of the fact that Madhow does not disclose interference matrix construction for the case when the interference and the signal of interest are at different lengths. Thus, Claim 19 is novel and non-obvious over Madhow.

Applicant believes that Dependent Claims 20-24 are allowable as well.

Regarding Claim 25, Applicant wishes to make a similar argument to those made in connection with Claim 1 in that Madhow does not teach the construction of an interference matrix in the context of receiving symbols with multiple lengths, and does not teach "controller, operable to form an interference matrix comprising at least a first interference vector, an intermediate interference vector, and a last interference vector, wherein said first and last interference vectors each correspond to a partial interfering symbol included in a first channel of said interfering signal path,".

Applicant believes that Claims 26-28 are allowable since they depend on Claim 25.

Regarding Claim 29, Applicant contends that Madhow does not teach the "means for forming at least three interference vectors for each portion of a symbol in said interfering symbol path that overlaps with a desired signal", since Madhow does not deal with the issue of having multiple symbol lengths, which is what gives rise to the formation of the three interference vectors.

Applicant contends that Dependent Claim 30 is allowable as well.

Conclusion

Applicant has discussed all points raised in the Action. Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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